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BACKGROUND - MIDAS

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The possibility of accomplishing useful reconnaissance with satellite-borne infrared sensing equipment was recognized during the early design study of the Air Force Advanced Reconnaissance System, WS 117L. A proposal to this effect was included in LMSD-1536, Pied Piper Development Plan dated 1 March 1956, under Contract AF 33(616)-3105. The approach outlined in this report was in consonance with the general system development requirements which established the WS 117L Program.

Subsequently, a prime contractor was selected by the U. S. Air Force for the WS 117L Development Program. This work was undertaken under Contract AF 04(647)-97, supplemented by Letter Contract AF 04(647)-181. Under the terms of these contracts, the prime contractor was directed to conduct a program of research and development designed to accomplish satellite-borne reconnaissance using each of three payload systems: visual, ferret and infrared. Initial work in the infrared field was conducted as an integral part of the WS 117L development.

To meet the requirements of the contract, a complex of subcontractors was organized to assist the prime contractor in determining the feasibility and to establish the preliminary design of an experimental ICBM early warning system.

As a result of significant progress in this development program, the feasibility and the technical basis for a satellite-borne attack alarm system were presented in WS 117L Subsystem G Engineering Analysis Report, Attack Alarm System, dated 19 May 1958. On 5 November 1958 the ARPA published Order No. 38-59 which separated the Infrared Reconnaissance Development (Subsystem "G") from the basic SAMOS Program and established the Infrared Development as the Missile Defense Alarm System (MIDAS). An Air Force Space System Development Plan for the MIDAS Program was prepared in January 1959. This plan, submitted in accordance with ARPA Order No. 38-59 and USAF General Operational Requirement 80-3 and 80-3A, provided for the acceleration and expansion of WS 117L infrared reconnaissance development into the Missile Defense Alarm System. The system, as conceived, utilized a network of twenty (20) satellites on random orbits at a minimum altitude of 1000 nautical miles.

A paramount consideration of this development plan was to utilize a reasonable and conservative approach to the various problems involved in the MIDAS system. This approach in turn led to a number of initial design decisions, the basis of which was to minimize the number of required modifications to developments under way in concurrent WS 117L programs, as well as to minimize the number of uncertainties which would influence the over-all design.

It was, however, a basic premise of the development plan that continued system analysis, design, and measurement efforts would be made

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#139

to amplify these initial design decisions. The results of these efforts indicate that the orbit altitude can be increased to approximately 2000 nautical miles. The area observable by an individual satellite increased almost two-fold. The total number of vehicles required for the network was, therefore, reduced.

Reflecting these advancements, the basic design for MIDAS (consisting of a network of 12 satellites operating on distributed polar orbits at an altitude of 2000 nautical miles) was presented in MIDAS Engineering Analysis Report in March 1959.

This system, together with the option for converting to controlled orbit operation, was evaluated by the Air Force Ballistic Missile Division in May 1959. The means of achieving orbit control appeared sufficiently sound to recommend testing orbit-control components in early MIDAS R&D flights.

Analyses have continued which further define system parameters for critical components of the MIDAS system. It has been concluded that incorporation of dual burning, increased volume propellant tanks, and orbit-control techniques in the MIDAS system should be accomplished early in the R&D program. These design features, if substantiated in the flight test program, will permit the achievement of a 2000 nautical mile orbit altitude and a reduction in the number of satellites to eight for the MIDAS network.

On 14 December 1959, the AFBMC considered the proposed MIDAS development plan consisting of 10 flights beginning in February 1960. As a result of this, Hq USAF instructed AFBMD to prepare a development plan based on the funds available in FY 60 and FY 61. (FY 60, P-600 \$46.9 million, MCP \$12.8 million, and FY 61, P-600 \$81.0 million, MCP \$11.0 million) In the plan heavy emphasis is to be placed on reliability.